

ARAMCO WORLD

OCTOBER, 1957



The Boy Columbus

Aramco World

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PICTURE CREDITS: Cover photograph—Courtesy, Museum of Fine Arts, Boston. Pages 3, 5 (lower right)—Aramco photos by T. F. Walters. Pages 5 (lower left), 10, 11, 12, 13—Aramco photos by E. E. Seal. Page 5 (upper right)—Aramco photo by Khalil Nasr. Pages 14 (top), 16 (left)—Aramco photos by Carl von Hoffman. Page 7—Bettmann Archive. Pages 8 (top right), 9 (upper and lower right), 19—Culver Service. Pages 8 (center and lower right), 9 (top and lower left)—Ewing Galloway. Pages 14 (lower), 15, 16 (right)—Bituminous Coal Institute. Page 17 (top)—William Vandivert for West Kentucky Coal Co., (lower)—Pittsburgh Consolidation Coal Co.

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No end of "whys" crop up on their first trip to the United States for American children who are

Growing up in Saudi Arabia

A HUMOROUS rhyme of the 1890's starts . . . "I never saw a purple cow, I never hope to see one." The poet of these lines, if alive today, could have composed a special verse for some of the young American children living in the oil towns of eastern Saudi Arabia. For them, a one-humped camel is a familiar sight; a cow of *any* color is a rare sight.

In the Persian Gulf communities, almost 2,000 American children make their homes with their parents. Together, they spend their days pleasantly and healthfully. As residents of a foreign country during their growing-up years, they find some big surprises in store for them when they return to their homeland every other year for a two-month

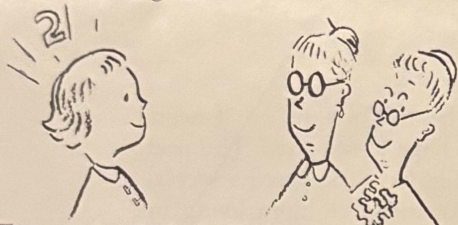


GROWING UP IN SAUDI ARABIA

vacation. The towns Dhahran, Ras Tanura and Abqaiq, where the Aramco people reside, look strikingly like any in America. Yet, they stand 7,000 miles — twenty-six hours' flying time or a month's sailing time — from the nearest corner of American soil. The schools these children attend in the Desert Kingdom resemble those in New Jersey or Texas. Yet, the scholastic year runs around the calendar with every fourth month a vacation; with classes on Sunday, and none on Friday. The language these children speak is English; yet, their speech is flavored with Arabic words and phrases.

Children have keen eyes and frank tongues. And, the American tots of the Arabian peninsula never hesitate to voice their amazement at what strikes them as strange when they visit the United States.

"Why, I have two grandmothers!", a little American girl



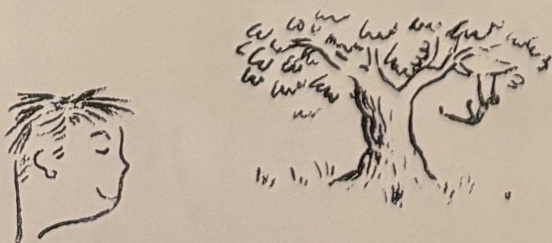
of Ras Tanura shrieked gleefully when her father's mother and her mother's mother greeted her at a United States airport. When she met her great grandfather the next day, she was even more baffled. She exclaimed: "I didn't know that people lived to be so old." An understandable observation, since the majority of Americans in Saudi Arabia belong to the younger age groups.

Reaction to weather depends upon where the youngsters' parents originate. "Being New Englanders, one American father in Abqaiq comments, 'we talked up snow so the kids wouldn't be too shocked when we went to Massachusetts on long vacation last winter.'" This parent was somewhat chagrined when his three-year-old daughter experienced her first Yankee blizzard. She scooped up a handful of snow and fingered it. Then, dropping it with disgust, she blurted out, "It's cold!"

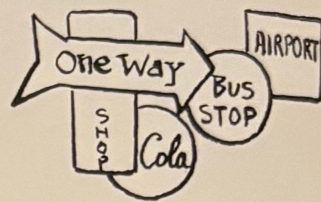
Of course, many a Texan and Southern Californian has reached a ripe old age, traveled through half the world, including Saudi Arabia, and never seen a flake of snow.

Rain is not unknown in Saudi Arabia, but it falls there more sparingly than in most of the United States. The day-after-day showers the Aramco children encounter when Stateside in winter or spring bring no end of "whys."

The green oases of the Eastern Province possess stately palm trees with few lower branches. The towns the Americans inhabit grew out of the wastelands, but now lovely shade trees carefully nurtured against the scorching sun bloom the year round. Woe to the young athlete who would use these trees to chin himself. An American mother recounts that her son had never climbed a tree until the family vacationed in the United States.



"Why are the stop signs only in English?", an Arabia-born American youngster queried his aunt on a trip to his father's native city in the Middle West. She explained that in Des Moines, no one spoke anything but English. "In my home town," he stated with civic pride, "they talk two languages."



In fact, in the oil communities you hear Urdu (a language of Pakistan), Portuguese, Italian and Dutch in addition to Arabic and English.

These youngsters lace their sentences with Arabic phrases . . . *waajid zain* for 'very good,' *shoof* for 'look,' *shway shway* for 'slowly,' and so on. "Let's go down to the *suq*," is what they often say, using the Arabic word for 'bazaar,' or 'market place.'

One mother rejoices in the fact that many of the juveniles escape the epidemics of English slang that periodically break out across America. As her teen-age daughter wrote after she had enrolled in a college in the States: "I had to learn a whole new 'slanguage'".

Stairways, elevators and escalators sometimes stun the Aramco children. In Saudi Arabia, where there's abundant



space to spread out, most buildings are low-lying and hug the ground. There is no need for the commonplace American machines of ascent.

Skyscrapers, the Western Hemisphere's answer to space problems, bewilder the Aramco children as much as they do a European or an Asian. And bridges, for youngsters who spend their early years in the bridgeless land of Saudi Arabia, bring their fair share of gasps.

Like some children from the large cities of America, the Aramco children occasionally have trouble distinguishing animal species. For some, a chicken and a turkey are synonymous. They have pored over pictures of cows in their textbooks, but when they come face to face with the animal on the hoof, they are overwhelmed by its size. A child who had spent his tender years in the Middle Eastern oil towns thought that American zookeepers were completely ridiculous because they kept camels behind cages and not cows.

Other confusions beset the children. For them, the only real money is the Saudi riyal, which they see change hands

in the *suqs* every day. The nicknames of American coins, such as 'dime' and 'nickel,' are unfamiliar. And, when the families pass through Europe or Asia on vacation, the Greek drachmas, Indian rupees, Lebanese pounds, Italian lire, French francs, Dutch guilders and all the other currencies picked up along the way bewilder the young minds.

At suppertime in Dhahran recently, an American father telephoned his brother in San Francisco. The oilman's youngster begged to say "hello" to his Uncle Bob. The tot got on the line and asked his Californian kinsman what he was doing. The uncle replied that he was about to eat his breakfast. Cupping his hand over the receiver, the youngster yelled, "Why do you sleep so late in the day, Uncle Bob?" The father's subsequent explanations about twelve-hour time differences did not convince the lad.

Among the Americans of eastern Saudi Arabia, the days of the week retain their English names. The work and school week is calculated in a different way from Europe and America. Saudi Arabia is a Moslem country where Friday, not Sunday, is the Sabbath. This means that all offices and classes are closed. And it means that Aramco children, when back in the States, find it difficult to understand why American schools do not follow a similar schedule.

But the biggest wonder of all, one Aramco mother relates about her five-year-old son, was the array of toys that the American cereal box tops can secure. "It was like Aladdin's magic lamp for him," she says.

Since Aramco's full-fledged oil operations began, some 1,121 American children have been born in eastern Saudi Arabia. Many of the youngsters have since moved to the United States and that inevitable question among garrulous youngsters has come up: "Where were you born?"

"I was born in Ras Tanura," a five-year-old replied, gleaming. "But where were your parents born?" came the second question. The little curly head replied, "Here in Baltimore," knowing full well that her companions would not consider this name half so exotic as Ras Tanura.

The first of the American youngsters born in the Persian Gulf towns are approaching their late teens. The oldest is seventeen. The day may come when some of these young men and women will return to the Desert Kingdom to live and work, as their parents did. Maybe, their offspring will be born in the oil towns. If this happens, a second-generation Arabia-born American like the curly-headed youngster, and with the same predicament, will be able to declare in all truthfulness: "My father was born in Ras Tanura, too."



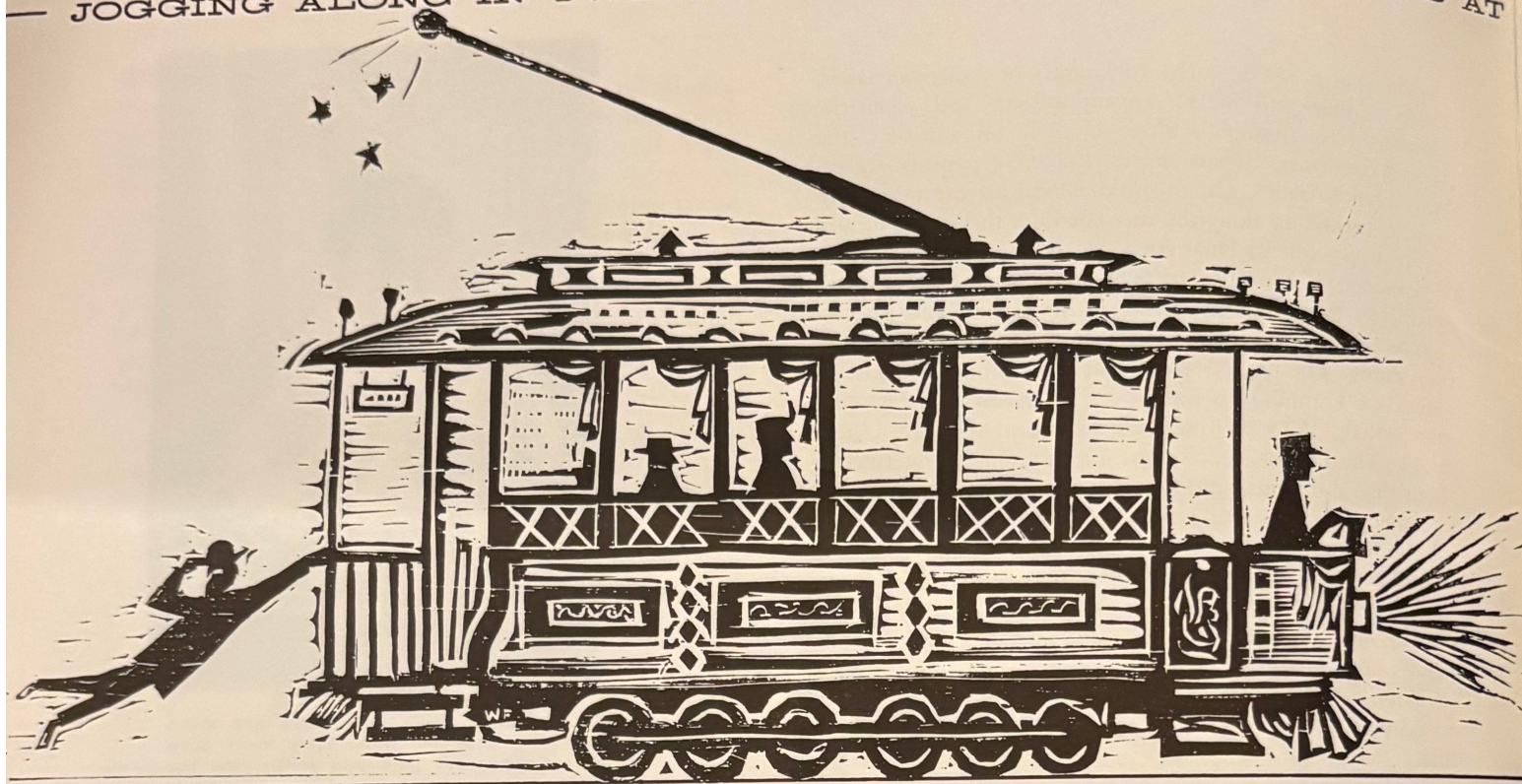
Mrs. Ellis Hill's twin boys are more than a year old now. They were born in Dhahran in 1956, and at the ripe age of two months traveled with their parents on the "Andrea Doria" when it collided with the liner "Stockholm".



These young Americans first saw the light of day in Arabia. Children of the Warren Johnsons, they are: Jane Ellen, nine; Gerald, seven; David, three.



Judy Gelinas (left) and her sister, Sandra, discuss topics of the day on their way home from school. Their parents are Mr. and Mrs. Eddie Gelinas; their birthplace, Saudi Arabia.



THERE is much to be said against progress. And most of it got said in the Cable Car War which preserved for San Francisco a unique rapid transit relic, at the same time adding zest to the city's 1947 mayoralty election. Today that civic rumpus might be shrugged off as nothing more than mulish frivolity. However, such a humorless view has returned more than one public official to private life. So let us give ear to the voice of the prospective past, the obsolescent traces of yesterday.

First, the case of the last remaining cable street railway, San Francisco's California Street Line. The fall of Mayor Roger Lapham was predestined by his innocent conviction that municipal improvements can be reduced to cold logic. Elected on a reform ticket, he announced a plan for husbanding the taxpayer's dollar by discarding the city's cable cars for buses. The Mayor got about the thanks he would have earned if he had tried to cut printing bills by shortening the city's name to Frisco.

The call to form a citizens' Committee to Save the Cable Cars was sounded by two spiritual descendants of Joan of Arc: Mrs. H. Klussman, a stalwart of the San Francisco Federation of Arts, and Mrs. E. O. Kelsey, civic affairs chairman of the California Spring Blossoms and Wildflower Association. When the dust settled the Committee's champion, Superior Judge E. E. Robinson, had easily unseated the unrepentant Mr. Lapham by pledging, "My whole heart is for the cable car . . . a symbol of San Francisco's picturesque life and traditions . . . most useful and effective on our hills."

San Francisco's crusade to save its antique tourist attraction came at the futile end phase of a cycle which accompanies every unsettling innovation, a cycle which starts with splenetic hostility, shifts to blasé acceptance, and fades out with sticky nostalgia. By the rules of cost accounting and engineering, the electric trolley car demoted the cable variety to junk thirteen years after its San Francisco debut in 1873. But where public affection is focused you can even find such anachronisms as the horse-car line said still to be hauling summer visitors on the Isle of Man. And now that the ravages of progress have brought the few remaining street railways near the end of the line, a half century of memories are making a last stop in trolley car museums.

Except in the twenty-two U. S. cities where a youngster can still ride on one, there is no cause for worry if he asks, "Daddy, what was a trolley car?" As recently as the Nineteen Twenties, when the country's trolley tracks extended 45,000 miles, and defined the main street of almost every town of over 7,500, no alert child could ask such a question. But with operating mileage now down to about 4,000 miles, the chief evidence of the trolley car era is in the skeletal remains of abandoned steel rails. An obstacle to safe driving and street maintenance, those rusting tracks can nevertheless lead you back to the dawn of the trolley car and farther, to New York City in 1832.

Mass transportation in that day was by shanks' mare, good for the constitution, but imposing tight restraint on a city's size. The omnibus, an evolution of the stage coach,

THERE GOES THE TROLLEY

was beginning to give the man on the street a wider range at 3-4 m.p.h. This vehicle was one notch better than nothing, but only hardy types braved its cobblestone ride and infestation of pickpockets. A way out was shown by an English interurban line which achieved 6 m.p.h. with a horse-drawn shanty on wooden rails. New York's version rode on iron rails, each horse car carrying up to thirty passengers at 6-8 m.p.h. and doing the work of three omnibuses.

From omnibus to horse car had meant only a minor emotional adjustment for the riding public. Horses were . . . horses . . . and rails carried with them some of the wonder of the steam locomotive. But mechanical rapid transit, by cable and trolley car, startled, jolted, and occasionally shocked its riders into mass participation in today's accelerating technological change. Acquiring a taste for the new tempo was seldom easy, and never dull.

Steam and cast iron had given wings to the popular imagination. But the concept of a horseless car went against centuries of training. At the brink of greatness some such psychic conflict paralyzed the gripman assigned to pilot the first cable car on its maiden run. Upon hearing the signal to go he gave way to panic, sinking into oblivion with the words, "I have a wife and children to consider." Whereupon Andrew S. Hallidie, the car's designer, climbed aboard for a successful solo, opening the way for eight lines in his home city of San Francisco, plus lines in twelve other American cities.

We can sympathize with the horror and indignation that

greeted proposals for electric traction. Prospective passengers saw little distinction between batteries, generators, and lightning bolts. The idea of being propelled by a captive thunderstorm drew impassioned predictions of mass electrocution, social unrest, and an unbalancing of natural forces. As it turned out, there was enough truth in these fears to invest the trolley car with legendary qualities.

Credit for the first trolley system to run on time goes to Frank J. Sprague, one of the first electrical engineers to favor slide rules over trial and error. But on an early test run he lost a backer and gained a lesson in one memorable second. Railroad tycoon Jay Gould was on hand, with Sprague at the controls. For a showy get-away Sprague threw on full power. Within a yard of Gould an open, strip-metal fuse let go with thunder-clap report and blind-



Philadelphians paid a nickel in 1880 to ride their latest public conveyance; this horse-drawn coach carrying eight persons.

THERE GOES THE TROLLEY

ing flash. Success had not spoiled Gould's reflexes, and by the time he stopped running his interest in trolley cars had ceased. Thereafter fuses were shielded and tucked out of sight.

In 1888 Richmond, Virginia, invited Sprague to risk his all by building a 42-car trolley system in ninety days, to be paid for only upon satisfactory completion. With the grit to match his wit, Sprague met his impossible deadline. Two years later 150 American communities had followed Richmond's example. In another twelve years trackage reached 22,000 miles.

Of all public utilities, the trolley car has perhaps been the most conspicuous. Its ever-present tracks and overhead wires sang and hummed while an approaching car was still out of sight. Close up it weaved and pitched to the "clang, clang" of its bell, the screech of wheel flanges on curves, and the crackle of blue sparks dancing along with its trolley wheel. By its assault on the senses the trolley was placed only a little this side of a fireworks display. Yet its decibels were never enough to overawe the public into uncritical silence. Furthermore, there was little intimidation in a pace which challenged agile passengers to board on the run.

Vocal riders found a new excuse to sound off in the first over-head electrical contact. Called a "troller," it looked like a toy four-wheel cart running on parallel wires. Trolled along by its connecting cable, it kept passengers in suspense by balking at switches and stops, creating quite a stir whenever it came crashing down onto the car roof. Sound public relations dictated a change of design and spelling: the under-riding "trolley" with pole and single wheel held in place by a spring.

It was just such imperfections that made getting there half the fun when you went by trolley car. The mood was one of "Liberté, égalité, et fraternité." When conductors and passengers failed to see eye-to-eye on fares and transfers, social barriers could not long stand. The design of open cars, with transverse seats, no central aisle, and exterior running boards, left no room for ceremony. A carnival atmosphere was encouraged by the amusement parks which drew traffic to the ends of most suburban lines.

Before the implications of the internal combustion engine hit home, the trolley appeared blessed with an endless future, someday to stretch its network from the Atlantic to the Pacific. That dream vanished in a cloud of carbon monoxide, but as recently as 1937 one trolley car buff rode 976 different cars on a 1000-mile trip from Cleveland to St. Louis. In the Nineteen Twenties a continuous system stretched in a triangle from Pennsylvania to Missouri to New England. A popular excursion route took you the 265 miles from New York to Boston in twenty hours riding time. The total fare was \$2.40. If you were trying to prove a point, you could ride from Wilmington, Delaware, to Portland, Maine; or from Hudson, New York, to Watertown, Wisconsin.

A mere twenty-six years after giving their hearts to the trolley car, Americans found a new love. The first mass



Fifty years ago New Yorkers rode across town on cars guided by tracks but dependant on horses for motion.



Man power is still necessary for reversing one of San Francisco's famed cable cars around on its turntable.

This Pittsburgh streetcar travels a steep incline to deposit commuters in a mountainous residential area.

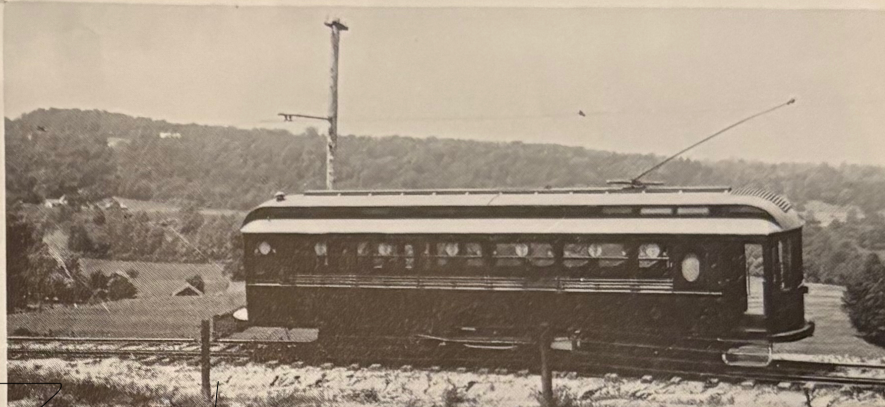




San Francisco's cable cars rank high in civic affection. That's Alcatraz Island in the bay.



Streetcars in Washington, D. C., are streamlined and move with remarkable speed. Here are cars lined up in front of the capital's Union Station.



Trolley cars sometimes link rural districts in what is known as interurban service.

flirtation came in the summer of 1914. In Los Angeles a lone automobile owner offered rush-hour travelers a nickel ride. By Christmas 700 of these "jitney" taxis cruised the city's streets. The trolley companies won the next round in the courts, but in the long run the flexibility of cars and buses, their freedom from rails or power lines, gave them the right of way. And now, only seventy years after Sprague's cars took Richmond's fancy, it has been five years since the last trolley was built in the United States.

Seventy years! Believe it or not, there are trolley cars still running which are almost that old. In Vienna you can ride on cars which waltzed along in the reign of Emperor Francis Joseph (1848-1916). Some of Vienna's newer cars may have a familiar look. They once rode on New York City's streets.

Where progress has not been equated with two cars per garage, or where the past has been there so long that its shell is carried lovingly into tomorrow, in at least thirty-five countries there will be nothing quaint about entering the

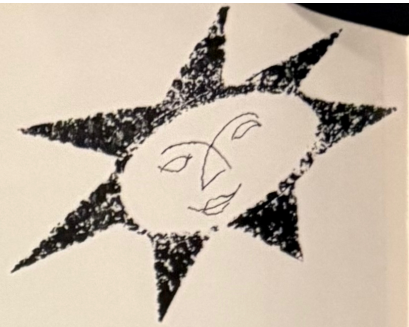
future in a trolley car. From Austria to New Zealand, from Argentina to Switzerland, emigrant Yankee trolley cars may still be building new memories seventy years from now.

As is fitting for each latitude, in their own way Americans can also be happily foolish about street railway rolling stock. Two national groups have given ritual, catalogs, and a sense of togetherness to the accumulation of trolley car pin-ups and old transfers. Boris Sidis, remembered as a prodigy among child prodigies, has distinguished this brotherhood with the term "peridromophiles" (lovers of wheels). Having at the age of fifteen graduated from Harvard *magna cum laude*, his chief public appearance since then has been as author of a definitive work on trolley transfer collections.

Not content with two-dimensional symbols, sixteen dedicated groups in the United States and Canada have collected whole trolley cars, about 160 of them, with enough track to keep life in their treasures. And by common consent the motoring public keeps faith when it stops the car for a taste of yesterday in a streetcar named "diner."

Ankara, Turkey's capital city, uses modern trolley buses.





The graceful robes and headpieces of Arab dress inspired the design

Cut from



of fresh, new styles

an Eastern Pattern



Betty Powell (left) displays a sleeveless party dress, and Pat Butler, a puffed-sleeve, off-the-shoulder creation. The dresses were made from the "ghutra", or head cloth. John Jones models one of the four-foot square, red and white checked cotton ghutras.

A wardrobe can stretch just so far. No matter how many clothes an American woman has when she leaves the United States for a foreign residence, she finds herself after a while with the eternally feminine feeling that she has nothing to wear. Since Aramco wives, daughters and staff members have to do their shopping for a two-year period, they feel the need of a "refresher course" when their States-acquired purchases begin to seem a bit weary.

And that refresher course can be a really stimulating one in a place like Saudi Arabia where unusual ideas and interesting fabrics are available.

The Dhahran Women's Group decided to unite last spring on a project that would spice jaded wardrobes with a blend of East and West. And the twain met most satisfactorily under such auspices. Mrs. Joseph Powell was assigned the task of meeting fashion's challenge and she enlisted the help of a designer living in Dhahran, Mrs. Henry Folkerts. Mrs. Folkerts, born in Holland, has designed clothes in Dutch Guiana, China, and the United States under the *nom de mode* of Petra.

So Betty Powell and Petra explored the bazaars of eastern Saudi Arabia; they cast inventive and appraising eyes on the graceful, ageless costumes of the Saudis. And they came up with the attractive dresses that were modeled in a show called "East Meets West" held in Dhahran last April. Charming Eastern materials and styles met the Western demand for ease and practicality in the designs pictured on these pages.

A thin black wool "bisht" trimmed with gold cording is cleverly translated into a dinner dress worn by Lois Taylor. The bisht is lightweight, cape-like outer garment.

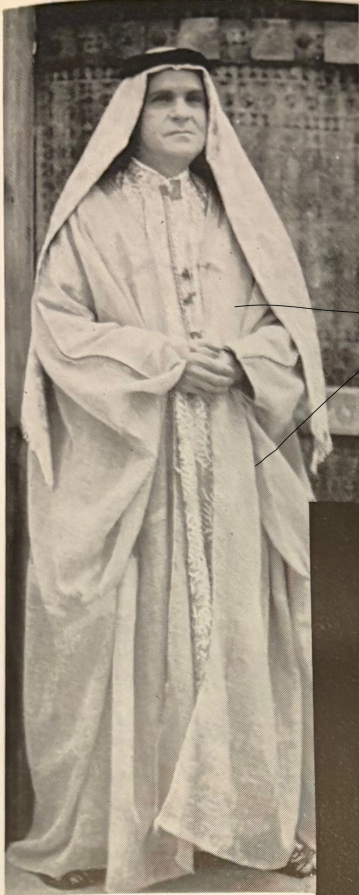


CUT FROM AN EASTERN PATTERN

The traditional "thobe", an ankle-length robe which combines the purpose of shirt and trousers, provided the fabric for Lois Taylor's scoop-neck, capped-sleeve summer frock of white embroidered organdie. The belt is red velvet.



Virginia Martin displays a dress created from a black and white figured ghutra. The setting is the theatre where the "East Meets West" fashion show was held last April by the Dhahran Women's Group.



Some styles were sent from New York to point up the Middle Eastern influence on fashions in America. Jim Barlow, left, wears a tan bisht that has more than a nodding acquaintance with the beige wool sports ensemble shown below.

F P



A white China silk thobe needed very little changing to slip easily into the role of the classic shirtwaist dress. In the background Arab dhows are berthed at a pier in al-Khobar on the Persian Gulf.

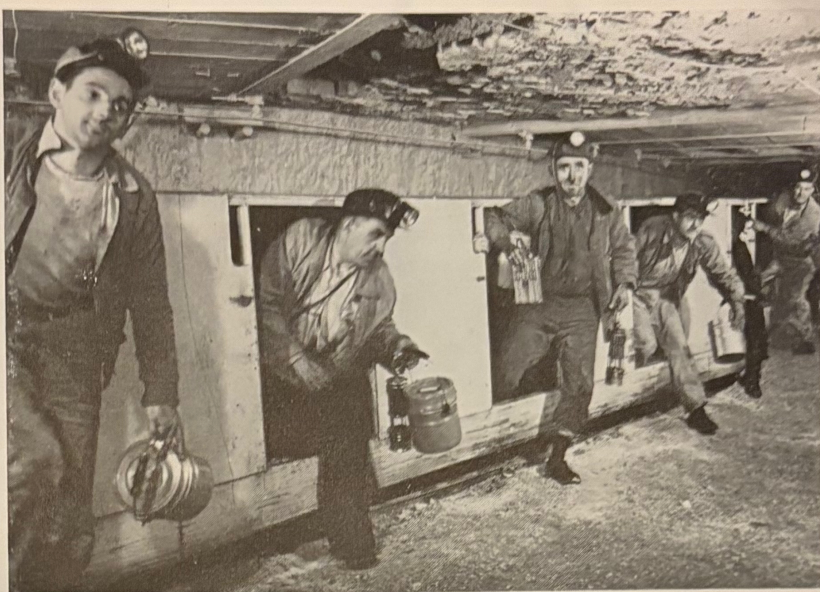


COAL

ZZFP

This pneumatic drill is moved around the mine on tracks or rubber-tired vehicles. Its job is to make holes for the medium that breaks the coal: explosives or perhaps compressed air, a newer technique for breaking coal.

A day's work is behind for these men as they climb out of steel man-trip cars and head for the showers.



Seams deep in the earth yield a black, power-packed substance that was ancient even when men first walked the earth.

THIS *could* be quite a long story, because it begins maybe three or four hundred million years ago.

But, let's skip over a few thousand millennia and get to the unhappy Mr. George Shoemaker, who is fleeing Philadelphia just ahead of the police, accused of "selling stones of no value."

This episode is during the War of 1812 and what Mr. Shoemaker is peddling is what Nature was starting to make in those somewhat earlier years: coal.

Today, the United States is producing and selling enough coal every day to fill a string of railroad cars 225 miles long, and nobody is being pinched for it, even in Philadelphia.

Instead, nearly everybody is *using* it—consciously or not. Coal supplies approximately thirty per cent of the energy used in the United States. It warms many homes and buildings. It turns many of the wheels of industry by producing some of our steam, gas and electricity. It helps to transform iron ore into steel, and limestone into cement.

Coal's host of by-products includes synthetic rubber, plastics, nylon, paints, dyes, disinfectants, fungicides, insecticides, food preservatives, fertilizers, detergents — even perfumes and fingernail polish. It yields aspirin, sulfa drugs, synthetic vitamins and saccharin. It provides TNT, printing ink, weed killers, roofing, paving and moth balls. And so on, and on.

Of course, Mr. Shoemaker's mistake was selling anthracite to people who hadn't learned to burn anything but bituminous. But, you don't have to go back 145 years to see that there's been a change.

You can go out among the coal miners and find any number of fathers and sons whose experiences bear no more resemblance than the magic lantern would to Cinerama. The only thing that's the same is what they're mining.

Pop remembers when he swung a pick to cut away the coal, and used a hand-turned auger to drill holes for explosives. He'd pack in the dynamite with mud, light the fuse, and run. When the pieces settled, he'd grab a hand shovel and scoop the shattered coal into cars, hauled by horses and mules. Some of these animals spent their entire lives underground.

But, none of this slow-motion, backbreaking nonsense for today's coal miner. He's a craftsman who works with awesome machines that do practically everything but punch the time clock. As a matter of fact, about ninety-eight per cent of all coal mined in the United States is cut mechanically; about eighty-five per cent loaded mechanically.

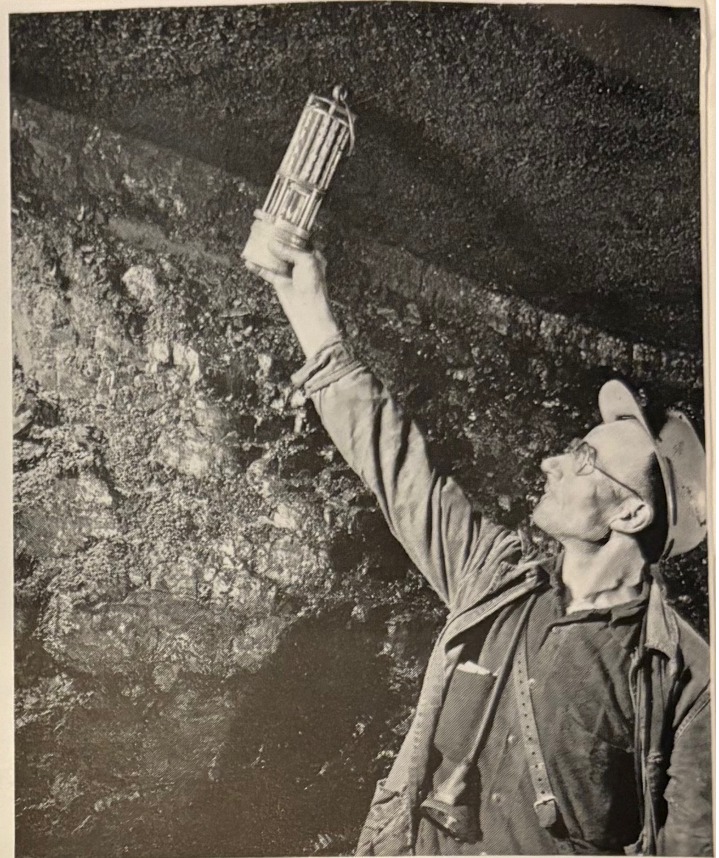
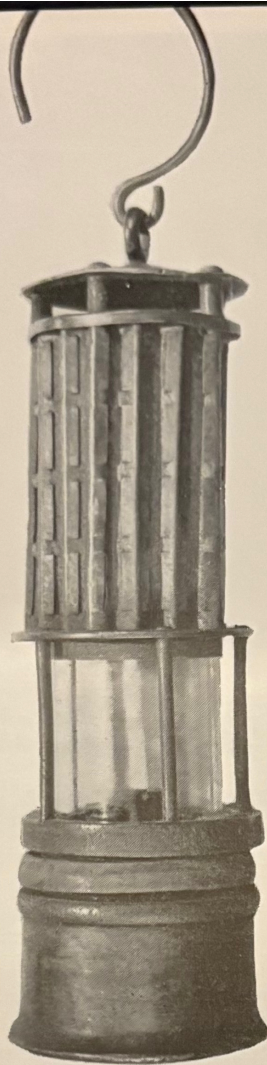
Like his predecessor, the modern miner operates at four types of mines, three of them underground: shaft, slope and drift. At shaft mines, elevators are used for transportation from and to the surface. A slope mine has railroad tracks running down a sloping tunnel to the coal seam. At a drift mine, the tunnel runs horizontally into the side of a hill.

And, as everybody knows, there are two principal types of coal: anthracite is the oldest in geologic age, and the nearest to pure carbon, with a relatively small percentage of volatile matter. Bituminous derives its name from "bitumens," a volatile chemical family of hydrocarbons, ranging from heavy pitch through liquid naphthas to gases.

About ninety-five per cent of the coal mined in the United States is bituminous. And, about seventy-five per cent comes from underground mines. So, how about a look at a big underground bituminous mine in, say, West Virginia?

This one happens to be a slope mine, and the man tells you it has an underground area of about ten square miles.

You join some miners on a fast-moving, electrically-operated "man-trip" train and roll along the surface for a while;



A mine "fire boss" inspects coal face for methane gas. He uses a special type of "safety" lamp (shown at the left). Gas is present if the lamp's flame turns blue.

then begin to dip, and pretty soon you're several hundred feet down in the earth, and the man says this is the coal seam.

This puzzles you, because the walls and roof are white, instead of black, but you find out this is a safety measure: powdered limestone, sprayed on the coal to keep the dust from becoming combustible.

You scoot along the electrically lighted main road, or "haulage way." Not a horse or mule in sight. But, you keep passing switches, leading down side alleys to "rooms" where miners are working. The fellow with you mentions that American mines operate around 250,000 mine cars and 14,000 electric locomotives. In addition, great conveyor belts carry coal as far as five miles underground before starting it toward the surface. They'll move 1,000 tons an hour or more.

But . . . here you are at the end of the line, ready for a short walk to the coal "face" where you'll see how they mine coal in 1957.

First comes an operator with a caterpillar-mounted electric cutting machine that makes you think of a gigantic ironing board—except it has teeth. This monster gnaws horizontal and vertical cuttings deep into the coal face to permit the coal to fall when it's blasted.

Next, here's a fellow with a huge electric drill, suspended from a boom on an electric mine locomotive, and looking very much like the one your dentist uses — only you're glad it isn't. Its job is to make the holes for "shooting,"

usually done with explosives. But, in this mine, there's a newer technique: cylinders of compressed air are inserted, and they release pressure at 10,000 pounds per square inch, producing a gentle breaking effect on the coal.

Now it's time for the loading machine, which has taken the place of pop's shovel. Resembling an enormous alligator, it moves its husky arms alternately to gather the coal onto a built-in conveyor that carries it back onto waiting shuttle cars. This tireless steel beast can load up to six tons a minute, all day long.

But, what really makes your eyes pop is the "continuous miner." All by itself, it does what otherwise would require the separate operations of cutting, drilling, blasting and loading. Moving on caterpillar treads, it tears into a coal face with a broad set of sharp, fearsome teeth, chewing out and loading as much as four tons every minute.

So . . . as you can see, today's coal miner is like the boy on the bicycle ("Look, Ma, no hands"). You'll observe new tricks, also, to make his life safer: The big roof bolts, for example, that bind together the overlying rock strata and make the roof self-supporting without the conventional heavy timbers.

And the clean air. The man lets you know that the weight of air circulated daily through a modern coal mine is more than six times the weight of coal mined during that day. He can't resist adding:

"As a matter of fact, the air in this mine, by chemical test, is fresher than the air in New York City offices."

This continuous air circulation dilutes and expels any dangerous gases that might be present. But, just in case any of them hang on, inspectors with ingenious gas detectors maintain constant vigilance. As a further precaution, electric-battery headlights have replaced the old open-flame lamps on the miners' caps. Smoking is, of course, prohibited—just as it is around an oil refinery. Experiments are under way, seeking non-sparking metals for drills.

Temperatures, incidentally, are fairly constant the year around down in a mine: relatively warm in winter and cool in summer.

Back at the surface, you go through the big preparation plant, known at a bituminous mine as the "tipple," and in anthracite fields as the "breaker." Here, as down below, mechanization runs the show. The coal goes in the top, gets cleaned of slate, rock and other impurities, is sorted into sizes, has a bath—and sometimes even an oil shampoo to clear away the last of the dust—and comes out the bottom, all ready to flow through chutes into waiting cars: the right size and quality to each car.

But, all of this has to do with underground mines. There are also surface mines in about twenty states, and they account for about a quarter of all coal production.

In surface mining, the first requirement is to clear away the "overburden," which is the rock and earth above the coal seam—sometimes as much as 100 feet thick. Here's where you'll see shovels that can gobble up forty to fifty tons of overburden in one bite. The biggest one—*sixteen stories high*—can handle *ninety tons* at a time.

If you wanted to go into the side of a hill for your coal, you might use one of the unbelievable robots, with an electronic attachment that locates the coal seam. It can poke its long nose 700 feet or more into the hill, bringing out more than seventy tons of coal an hour.

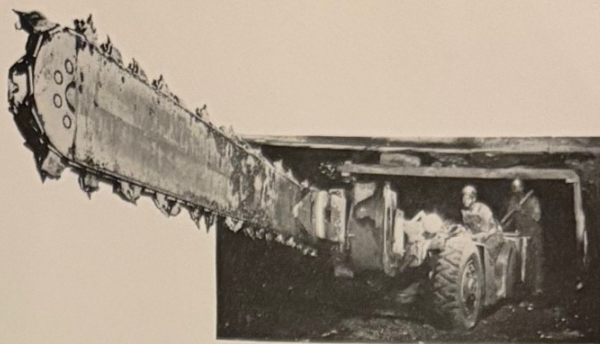
Or, you might prefer one of the jumbo-size augers, ranging up to fifty-two inches in diameter. They can bore into the seam as far as 200 feet, and bring the coal out to a conveyor that loads it into trucks or railroad cars.

At present, about 5,500 companies are operating some 8,000 coal mines in the United States, and producing 500 million or more tons annually. More than half of the total comes from West Virginia and Pennsylvania, the latter producing *all* the anthracite. These two states employ approximately 158,000 of the nation's 269,000 coal miners, of whom 26,000 work in the anthracite fields. Next largest producers are Kentucky, Illinois and Ohio.

American coal miners are far ahead of any other country's in productivity. Their average: 11 tons per man-day, as against 1.8 tons in England and France, and 1.3 tons in Belgium.

This is a quick glimpse at modern coal mining. But, it gives barely a hint of what's to come. Unceasingly, the engineers and researchers are seeking out new ways for putting coal to work *as coal*, new equipment to burn it more conveniently and efficiently, new ways of using coal in *other forms*, and new machines to mine coal better.

In transportation, they've already come up with a 110-mile pipeline from Cadiz, Ohio, to Cleveland, carrying coal



What appears to be a giant ironing board equipped with teeth moves in to cut coal so it will fall when blasted.



"The Mountaineer", world's largest shovel, went into operation at Cadiz, Ohio, early in 1956. It stands as high as a 16-story building and can lift 250 tons, or the total weight of 166 automobiles.

that has been crushed and mixed with water to form a slurry. They're predicting a network of such lines, from mines to markets.

A major research project right now is a coal-fueled gas turbine, which may be the heart of a revolutionary locomotive of the future. It will need no water, little lubrication, and be smokeless.

But, to the average person, uninitiated into the mysteries of technology, it sounds like science fiction when they say they're going to *make coal's energy available without even mining it*.

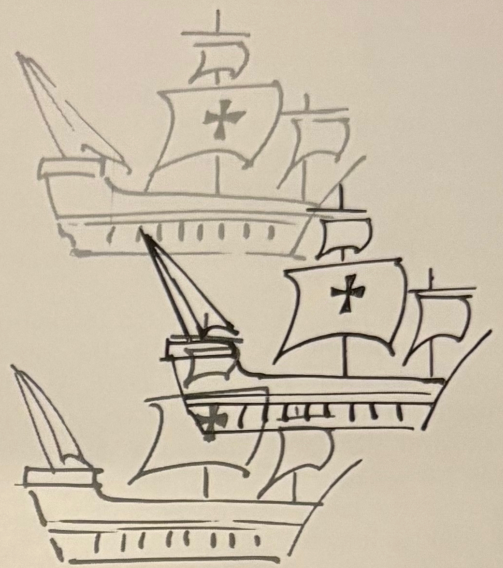
To this end, experiments are now under way in underground gasification, wherein coal is gasified by controlled burning right in the seam, where nature created it. If this succeeds, electric power plants can be located right at the mine mouths, getting their fuel from the "basement." The gas could also be used for synthetic liquid fuels whenever they become economically practicable.

Little wonder that the industry predicts that its production will be double its present level by 1975.

All in all, the feeling seems to be that the Philadelphia gendarmerie were a trifle hasty in their attitude toward Mr. Shoemaker.

That Man

COLUMBUS



People thought that the redheaded freckle-faced ambitious sailor from Genoa had some peculiar ideas about geography... until that momentous October day in 1492.

ONE day 465 years ago the people of a certain town in Spain heard a commotion. Coming into town astride a mule was a tall figure of a man — a redheaded, freckle-faced man who was to change the history of the world. He rode dejectedly, paying no attention to the children who ran beside him, jeering. Some pointed to their heads and cried:

"Here comes the crazy man. He wants to sail off the edge of the earth!"

Being jeered was no novelty to Christopher Columbus. For eighteen years he had been laughed at by some of the best scholars and scientists in Europe. (Who but a madman would think of sailing west to go east? He wanted to reach India — yet everyone knew that India lay east.) Only today Spain's great Queen Isabella had said a final, polite "No!" to his impassioned plea for men and ships.

Columbus continued his melancholy ride northward. Not long afterward a royal messenger on horseback clattered into town, riding fast. *"Which way did he go?"* he shouted. The townsfolk pointed, and the messenger went in hot pursuit.

Columbus had reached the bridge of Piños, about two leagues from Granada, when he heard the fast hoofbeats behind him. *"Come back!"* the messenger shouted. *"The Queen has sent for you. She has changed her mind!"*

And thus at a lonely pass near the mountain of Elvira

one day in February 1492, a great man came to a turning point that would change the whole world.

Who was this man Columbus? Where did he come from? What would he be like if he lived today? What would he look like? What would people say about him — and what would his job be?

If Columbus had lived today he might have been an actor, or a business executive in charge of some very exciting project. He would have been married and devoted to his family. He might have been a popular political figure, or an engineer in outerspace rocket development. It is rather doubtful that he would have been an admiral today, as he was in 1492; his soul cried for adventure and challenge, and today's peacetime navies would be a shade too mild for his blood.

Perhaps you're surprised. Columbus an actor? It's quite possible. To see why, let's go back to his origin.

Several noble families claim Columbus, but it seems established today that he was a poor boy, the son of a weaver in Genoa. A new house stands on the foundation of the home in which he lived for awhile as a boy.

All boys in Genoa looked to the sea — which meant the Mediterranean. Life at a loom was too tame for Christopher, and at the age of fourteen he already was cruising the Mediterranean on a raiding vessel commanded by a daring relative. He learned to pilot and navigate; he de-



The New World's discoverer as he appeared in an old engraving.

veloped an interest in maps and in commerce. And he learned to fight.

He developed, too, a strong streak of cunning. He, himself, wrote of being put in command of a small raider, while yet a boy. He was sent by Count René of Provence, to capture a galley. His crew were frightened and refused to go on. To fool them, Columbus pretended to sail toward home. Actually he sailed them straight into battle. How did he deceive them? He says he simply doctored the compass, possibly by concealing a lodestone near it.

After years at sea in commerce ships, or in raiders in

various small wars, he reached Portugal under dramatic circumstances. He was a seaman aboard a Genoese merchant convoy when it was attacked by French and Portuguese ships at sea. He fought hard and was wounded. Then, when his ship burned and sank, he seized an oar, jumped into the sea and swam for the Portuguese coast six miles away. He finally was washed up on the beach and cared for in the Genoese colony of Lisbon.

From this dramatic background emerged the tall and engaging young redhead who dreamed of sailing west to India. A man who lives a dramatic life develops a sense of drama; Columbus also had "presence" — the quality that commands attention and respect. His voice was strong and pleasant; he was captivated by his own dream — and, in turn, he captivated others. Physically he was powerful and well-built, without an ounce of excess fat. He bore himself well, and had a long face and was good-looking. With all this, he also had, his biographers say, a poet's sense of beauty. And he had an energetic, inquiring and accurate mind.

With these qualities, is it any wonder that a weaver's son was able to talk his way into the courts of Portugal and Spain? His fervor and good looks certainly charmed Queen Isabella.

Columbus had one more gift: the ability to make and keep a few close friendships with influential men. These men believed in him — and it was one of them, Luís de San Angel, who rebuked Isabella for denying him ships and persuaded her to change her mind after Columbus, in desperation, had started for France.

Columbus had one large personal shortcoming, too; it contributed to later unhappiness in a life that should have been brimful of happiness and success. He was ambitious for the success of his ventures, as he should have been. But the weaver's son was ambitious also to become rich and famous. This *personal* ambition was, perhaps, his greatest weakness.

Remembering schoolbook pictures, many of us think of Columbus as silent, austere, colorless. Actually, he was anything but that.

Says the historian Oveido, who saw him: "A man of honest parents and life, of good stature and appearance, taller than the average and strongly limbed: the eyes lively and the other parts of the face of good proportion, the hair very red and the face somewhat ruddy and freckled; fair in speech, tactful and of great creative talent . . . gracious when he wished to be, irascible when annoyed."

Bishop Las Casas: "... beard and hair red when young but very soon turned grey from his labors; he was affable and cheerful in speaking . . . eloquent and boastful in his negotiations; he was serious in moderation, affable with strangers and with members of his household gentle and pleasant, with modest gravity and discreet conversation; and so could easily incite those who saw him to love him."

Columbus knew thoroughly what he planned to do. He was an expert chartmaker; he learned the science of geog-

THAT MAN COLUMBUS

raphy (which had been preserved by the Arab sages when the study of it languished in Europe). He had talked to navigators, had corresponded with scholars. He had sailed to Iceland and had heard tales of the distant "Vinland" — either Nova Scotia or New England. He had studied reports of travelers. He knew that strangely-carved sticks were sometimes picked up far at sea, that two men with faces unlike those seen in Europe or Africa had been washed ashore in the Azores.

Columbus was happily married, for a number of years, to the daughter of a prominent Portuguese family, and she bore him one son, Diego. His wife died and he never married again although later he became devoted to a peasant girl named Beatriz. Historians say he never married Beatriz, although he provided carefully for her in his will.

In this romance lies one clue to the despair and failure that overtook Columbus late in life. Historians believe he did not remarry *because Beatriz would have been "in the way" socially* in his important negotiations at court.

Thus Columbus placed ambition above love. In all things he seems to have been guided by ambition. It was lofty ambition, to be sure, but unfortunately, it became too complex.

If he had been content to be a discoverer, life might have dealt with him more happily. He could have rested content at the height of his fame. But he also aspired to be an administrator and developer. And he wanted dignity and wealth appropriate to his position. His second, third and fourth voyages to America were anti-climactic and bred trouble; he had undertaken too much. He was defeated by troubles in the islands he had discovered — and by enemies who undermined him in the court. When, after his third voyage, he returned to Spain in chains, only to be freed by Isabella, he actually sobbed at the feet of the King and Queen. Such tears from a proud man, however justified, could not have increased the royal respect for him. In the years that followed, he repeatedly appealed to the court to improve his status; he was not poor but he felt he was being deprived of his just rewards. The royal couple politely avoided him. He must, in fact, have become a nuisance to the court; and when Isabella died, his good judgment failed him entirely. He decided to visit the King. Since arthritis kept him from traveling on horseback, he sought to borrow, from Seville Cathedral, an elegant hearse which had once been used in the funeral of a Prince of the Church! In this ludicrous manner he would have ridden to court. As it happened, bad storms made the roads impassable; he finally rode on a mule.

In May 1506, Columbus died, a lonely, unhappy man. His death was not even officially recorded.

He had been spared one discovery which might have made him either very sad — or very happy. All his life he gloried in the belief he had sailed around the world and reached Asia. Would he have been miserable if he had known the truth — that he had gone less than half way? Or would he have died happy, knowing he had discovered a new continent beyond which lay still *another* great sea?

